Abstract- Hyperloop proposed by Elon Musk American businessman and investor. He is currently CEO & CTO of SpaceX and Chief Project Architect of Tesla Motors. Hyperloop Technologies is building its first test facility at the Apex Industrial Park in the City of North Las Vegas, Nevada. The company has already broken ground on the location and is expected to begin testing inside a two-mile tube by the end of this year. The Hyperloop would consist of capsules transported at high speeds through the length of low pressure tubes that are elevated off the ground. To simplify the science, reports suggest the pods would work similar to an air hockey table. The capsules are supported on a cushion of air and travel at average speeds of 600 mph, reaching a top speed of 760-800 mph.

Keywords- Air inlet, Batteries, Bulkhead, Capsules, Cushion of air and travel, Fan, High pressure tubes, Low pressure tubes, Motor, Suspension system

I. INTRODUCTION

Hyperloop is a technology where magnetically levitated pod-like vehicles are to move through vacuum tubes, for the purpose of transporting passengers, goods etc... at speeds in excess of 1000 kmph. The technology is based on the concept of magnetic levitation and the principle that high speeds can be attained at either zero or very low pressures.

Fig 1 Hyperloop Train Concept

In the context of India, using such a technology, as has been proposed for the railways recently, can bring about significant transformations in the following ways:

- A boost to economic productivity and GDP growth.
- A significant reduction in cost if the technology is adopted, especially when compared with alternatives such as bullet trains.
- Has the potential to revolutionize the entire transport sector.
- A tremendous saving in travelling times, both for passengers, as well as in case of freight transport.
- Significant reduction in energy consumption and also reduced pollution.
The hyperloop technology is without a doubt a significant technological breakthrough and has tremendous potential for providing numerous spillover benefits in various sectors.

II. METHODOLOGY

Hyperloop consist of a low pressure tube with capsules that are transported at both low and high speeds throughout the length of tube.

- Low Pressure Tube:
  
- Capsule
  
- The tube is made of steel
- The pressure in the tube is 100pa (equivalent to flying above 150,000 feet attitude)
- Pylons are placed every 30m to support the tube
  
- Suspension
  
- The capsules are supported via thrust air bearing that operate using a compressed air reservoir and aerodynamic lift.
• Electromagnetic Launch System

✓ Each accelerator has two 65 MVA inverters
✓ Inexpensive semiconductor switches allow the central inverters to energize only the section of track occupied by a capsule.

• Axial Compressor

✓ It avoids kantrowitz limit
✓ Air is compressed with a pressure ratio of 20:1
✓ Some air is stored for passenger and air bearing
✓ An onboard water tank is used for cooling of the air

• Suspension

✓ Thrust air bearings offer stability and extremely low drag
✓ Compressor pressurized air and aerodynamic lift provide better lift to capsule (0.5 to 1.3 mm)
✓ Independent mechanical suspension are provide for smooth ride for passengers
• Airlock

![Fig 8 Airlock](image)

- The tube has a lower pressure than the station
- So in order to maintain the pressure, we need to employ airlocks.

**Why the need of Hyperloop?**

Conventional means of transportation (road, water, air, and rail) tend to be some mix of expensive, slow, and environmentally harmful. Road travel is particularly problematic, given carbon emissions and the fluctuating price of oil. As the environmental dangers of energy consumption continue to worsen, mass transit will be crucial in the years to come.

![Fig 9 Outer parts of Hyperloop](image)

There are off-course drawbacks. Most notably, moving through a tube at such high speeds precludes large turns or changes in elevation. As a result, the system is optimal for straightforward trips across relatively level terrain. The tubes would be mounted on a series of pylons spread along the route, each pylon placed every 100 feet or so. The pylons will allow for slip due to thermal expansion and earthquakes, ensuring that the tubes will not be broken by any such movement.

![Fig 10 SpaceX has pledged to build a one-mile test track.](image)
Rail travel is relatively energy efficient and offers the most environmentally friendly option, but is too slow and expensive to be massively adopted. At distances less than 900 miles, supersonic travel is unfeasible, as most of the journey would be spent ascending and descending (the slowest parts of a flight.) Given these issues, the Hyperloop aims to make a cost-effective, high speed transportation system for use at moderate distances. As an example of the right type of distance, Musk uses the route from San Francisco to L.A. (a route the high-speed rail system will also cover). The Hyperloop tubes would have solar panels installed on the roof, allowing for a clean and self powering systems.

Connection of India

Hyperloop Transportation Technologies (HTT), the California-based start-up recently submitted a proposal to link the financial hub of Mumbai and the western India city of Pune one that would cut travelling time to around 25 minutes from 3 hours on an Indian Railways commuter line. It is currently awaiting approval from Prime Minister Narendra Modi's government. HTT's vision of ticket pricing, or rather lack of it, could be a hit in Asia's third largest economy. "Depending on the population density. For example, we can sell excess energy to the grid as well as implement premium services, such as premium advertising," Bibop Gresta, HTT chairman and chief operating officer, told CNBC Asia Speaking on the sidelines of the Global Entrepreneurship Community conference in Kuala Lumpur, he said the concept could be implemented in India for certain time slots, if the project is approved. "Is a ticket still a viable way of monetizing users in the 21st century? Probably not. We are looking to humanize transportation." As the brainchild of Musk, who first announced the idea in 2012, it's a concept straight out of science fiction and has been deemed the "fifth mode of transportation." Unlike the others, HTT utilizes a magnetic technology that allows its capsules to levitate and move. It is currently in negotiations for 20 projects across the world, including the U.S., Chile, Botswana, Egypt, the U.A.E, Indonesia, Malaysia, China, Russia and Australia. HTT claims its technology is cheaper to build than regular high-speed trains, which Modi's government has already been considering nationwide. In 2017, Indian Railways is set to begin construction on a bullet train connecting Mumbai to Ahmedabad.

"This can be the biggest opportunity or the biggest disaster for India … they can either choose the wrong technology and throw the country into the 19th century or bring the country into the 22nd century," Gresta exclaimed. "If you can move people from city to city at 1,200 (745 miles per hour) to 1,300 kilometers per hour, you have a system that can reshape society," he explained, suggesting that as distances shrink, economic productivity could increase as traffic disappears. Upgrading India's creaky mass-transit systems is one of Modi's top priorities. In late November, an Indore-Patna express train swerved off the tracks and killed around 146 people in what was deemed the worst train accident since 2010, ramping up pressure on Modi to invest in new infrastructure. Because HTT's track is electrified, its transport system consumes tiny amounts of energy, while conventional high-speed rails require a lot of energy that is usually subsidized by the state. HTT also employs a combination of renewable energies, including solar, wind, kinetic and for certain climates, geothermal. "This combination allows us to produce 20 percent more energy than we consume. We are like a giant power station that happens to transport people," That's an alluring factor for an Indian government looking to reduce carbon emissions by 33-35 percent within the next 13 years.

New materials are also being integrated into HTT's designs, including cement that absorbs carbon dioxide and produces oxygen, vertical gardens around pylons, and a system that absorbs dew from air and releases water to farmers. "We're also looking to embed a desalination system so you can pick up water from the sea and clean it. When you have a pipeline and solar panels, you already have desalination; you just need heat, which we have plenty of to harvest in the system." Everything about HTT seems disruptive to conventional practices, even its business structures."This is a better model
because it doesn't need to play the capitalistic game," he said. "There's a radical reasoning behind this. It is about contesting the consumption model that is affecting everything."

### Advantages of Hyperloop
- Capital cost is one-fourth of high-speed rail & operational cost will be a tenth.
- Will speed up transport with ease of travelling.
- Reduced operational cost as system does not have any mechanical parts.
- Mode of renewal energy could be used efficiently eg. Solar panels on the top of the tube, wind turbines in the pylons.
- Has the potential to revolutionize the entire transport sector.
- Economic benefits will be approximate 4 times greater than high speed train.
- Will be able to reduce energy consumption significantly.
- Can withstand on Earthquake.
- Will be able to reduce traffic congestion.
- High speed of 760-800 mph.
- Runs from solar power.
- No problem of traffic.
- Protect from earthquake by use of pylons.

### Disadvantages of Hyperloop
- High speed might cause dizziness.
- Land use rights are going to be a bitch
- It’s ugly and blocking up my view.
- Greenie pushback.
- Those are some small spaces in the capsules.
- Nothing is crash-proof.
- Hyperloop is that it requires a minimum distance between start and stop stations which is quite large (some reasonable portion of the total travel time has to be on full speed, else it would not make much sense) and also a maximum distance, due to the safety concerns of passengers spending time in an enclosed cabin with little comfort.
- Tube pressurization.
- Turning will be critical (with large radius).
- Insufficient movable space for passenger.

### III. CONCLUSION
- Hyperloop is a new idea of solar powered transportation system with high speed up to 800 mph.
- which is developed by US entrepreneur Elon Musk.
- It is new concept so there is some future work will be required for development of this project.
- As it has number of advantages it will very help full for transport public as well as good in very short period of time (at a top speed of 1220 kmph) and also in lower cost.
- A high speed transportation system known as Hyperloop introduced here.
- Using conventional magnetic levitation system.
- It’s basically magnetic levitation train in vacuum tubes helping in achieving high speeds.

### IV. ACKNOWLEDGMENT
I Deeply Express My Hearty Gratitude and Thanks to International Journal of Modern Trends in Engineering & Research.
REFERENCES


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